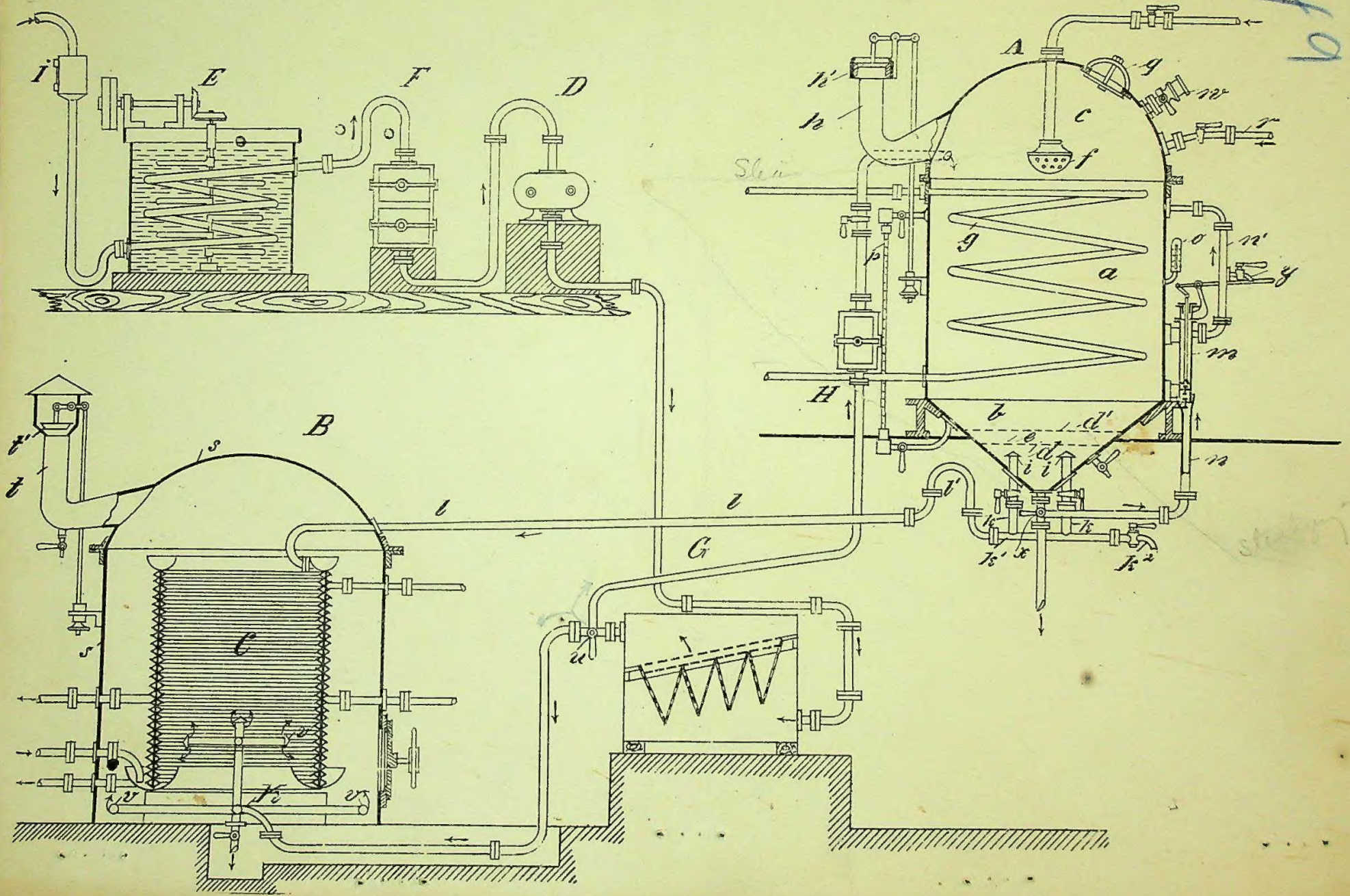


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Date of Application, 10th Feb., 1888
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A.D. 1888, 10th FEBRUARY. N° 2059.

PROVISIONAL SPECIFICATION.

Improvements relating to the Treatment of Beer Wort and to Apparatus therefor.

We, CONSTANTIN HOFFMANN, of Stendach, and LORENZ EBERT, of Scheibe i. Th. both in the Empire of Germany do hereby declare the nature of this invention to be as follows:—

5 The present invention relates to apparatus for sterilizing and cooling beer wort whereby the latter is kept completely protected against any injurious actions of the atmosphere during the whole cooling process, that is to say, from the boiling copper to the fermenting vat.

10 According to the present cooling process the beer wort is cooled either on coolers or by means of special apparatus, as this takes place with the admission of ordinary atmospheric air, the bacteria and sprout pores, never absent from the air, can act, and have a very deleterious effect upon, or infect the beer wort.

15 That such an infection frequently takes place is proved by the many changes in the beer wort during the cooling processes heretofore practised, and by the various abnormal phenomena of fermentation which occur despite the employment of sound yeast.

20 In order to obviate these inconveniences we provide the known cooling apparatus with a casing which can be hermetically closed and bring the beer wort, which runs boiling hot and therefore free from sprout to the cooling apparatus, into contact with sterilized air which therefore is free from sprouts and sporules. By the introduction of sterilized air into the casing of the cooling apparatus at a certain over pressure during the cooling, the beer wort remains quite free from sprout and after that the air necessary for the fermentation is introduced according to requirements, and the exhalation of the same is effected. The coolers and the sacks for removing the turbidness can be entirely dispensed with, as will hereinafter be more fully explained.

25 The improved apparatus consists of a wort sterilizing and filtering apparatus in combination with a cooling apparatus and its casing and an air-cooling apparatus, air drying apparatus, and air filtering device with a blower, and the accessory parts necessary therefor.

[Price 8d.]

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The sterilizing and filtering apparatus consists of an iron or copper vessel which can be hermetically closed and can withstand a pressure of several atmospheres. The bottom is taper, the head hemispherical. In the interior above the taper bottom are two superposed filters the intermediate space between them being filled with sterilized filtering material (chopped wood-wool) and hops. In the filtering apparatus is arranged a steam coil and in the hemispherical head a sprinkling rose. On the outside of the apparatus is an exhalation pipe or delivery pipe with a valve in order to close the interior of the apparatus wholly or partly against the outer air, furthermore the clarifying pipes, the mouths of which project inwardly above the bottom of the apparatus and which are each provided with a roof or covering in order that any solid parts cannot pass into the pipes. These clarifying pipes, meet below in a collecting pipe which is in connection with the goose-neck shaped siphon pipe and a bent pipe. Moreover, there is a pump outside on the apparatus, by means of which the turbid liquid can be transported through the pipes below the filters upwards above the same into the filtering apparatus. On the side of the collecting pipe is arranged at a suitable point a cock through which the whole clarifying apparatus can be conveniently emptied and cleaned by means of water under pressure.

The remainder of the fittings consists of the necessary cocks and pipes and other apparatus, of which may be specially mentioned a thermometer, a beer level gauge, manhole, an admission pipe with a cock for the entering beer wort, and so forth.

The cooling apparatus consists of an iron or copper casing capable of being hermetically closed and withstanding a pressure of several atmospheres, which surrounds the surface sprinkling apparatus at a suitable distance. The latter apparatus can be of any desired form and size, and we do not limit ourselves to the employment of definite forms and sizes of such cooling apparatus but reserve the right of using any of the known apparatus. The said casing is provided on the outside with an inlet pipe having the adjustable valve. The other fittings of the casing consist of the necessary outlet and inlet pipes, cocks, thermometers, manholes and the like; according to the kind of the cooling apparatus to be used, these parts, to the features of which no special importance is attached can be varied. Care must be taken that all the parts which lead into or from the apparatus shall be connected hermetically with the casing.

The cooling, drying and filtering device for sterilized air consists of a blower which sucks the air first through a preliminary cotton filter then through an air cooler and an air drier suitably filled with glowed charcoal. The air is moreover forced through the sprout-tight main filter or any other suitable air filter and then passes to the filtering apparatus, when the cock has been placed in the proper position. By turning this cock the air can also be driven into the distributing device. The latter is arranged in the casing of the cooling apparatus; it consists of several pipes having suitably shaped nozzles or orifices for the purpose of uniformly distributing the air entering the casing around the cooling apparatus. It may here be specially stated that the parts which serve to filter the air and free it from sprout, can be of any desired construction as we do not limit ourselves to definite forms and sizes of these apparatus.

The process of boiling, cooling and sterilizing the beer wort is mainly effected in the following manner.

The beer wort ready boiled is conducted from the boiling-copper, together with the hops, by means of the previously sterilized pipe into the sterilized apparatus filled with sterilized air; at the same time air that is quite free from sprout is forced into the apparatus by the blower so that a pressure is produced which is regulated by means of the valve in the outlet pipe in such a manner that no ordinary air can pass into the filtering apparatus. The beer wort can again be boiled by the steam coil; the steam thereby generated is led off through a pipe according to requirements. The beer wort is now left to rest, and all the openings of the apparatus are hermetically closed. The hops take their place upon the upper clarifying partition and after about an hour's rest the beer wort is filtered through the hops and through the sterilized filtering material contained between the two clarifying partitions. By the clarifying

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- device the beer wort is drawn from the apparatus by means of the siphon and passed through the swan-neck pipe connected therewith into the hermetically closed casing on to the sprinkling apparatus which has also previously been sterilized ; as soon as the beer level gauge indicates no wort, the hop is sprinkled over with hot water free
- 5 from sprouts by means of the sprinkling rose thereby removing all the beer wort from the hop. During the cooling of the beer wort, purified cooled air entirely freed from bacteria and sprouts is conducted and uniformly distributed in the casing through the air introducing and distributing device, so that a pressure is produced, whereby the oxygen necessary for the fermentation is conducted to the beer wort, and
- 10 exhalation is caused according to requirements by the use of the outlet pipe. The water of condensation flows, on the one hand, into the pipe whence it can be let off through a cock, and on the other hand to the bottom of the casing. The beer wort thus treated flows, free from turbidness, and also free from bacteria and sprouts, into the fermenting vats.
- 15 The sterilizing apparatus can also be used direct as a steam brewing copper. For this purpose, at the lowest point of the taper bottom is arranged a three-way cock with a branch pipe to the pump, the forcing pipe of which terminates above in the apparatus. Now, before the filtering proper of the beer wort above the hop takes place, the turbid beer wort below the filters is pumped out and in again above until
- 20 it flows free from any turbidness, which can be observed by a test cock on a pipe. The cleaning of the apparatus from the turbid parts remaining behind, and also the rinsing and running off of the wash or rinsing water for the apparatus, pump and other parts can take place by means of the three-way cock. The filtering apparatus can therefore serve for sterilizing and filtering the beer wort and at the same
- 25 time serve as a steam brewing copper enabling it to be hermetically closed, in order to enable the work with hops to be completely boiled in the same.

Dated this 10th day of February 1888.

HASELTINE, LAKE & Co.,
45, Southampton Buildings, London, W.C.,
Agents for the Applicants.

COMPLETE SPECIFICATION.

Improvements relating to the Treatment of Beer Wort and to Apparatus therefor.

We, CONSTANTIN HOFFMANN, of Studach, and LORENZ EBERT, of Scheibe, i. Th. both in the Empire of Germany do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

Our invention relates to apparatus for sterilizing and cooling beer wort whereby the latter is kept completely protected against any injurious actions of the atmosphere during the whole cooling process, that is to say ; from the boiling copper to the fermenting vat.

According to the cooling process heretofore used the beer wort is cooled either on coolers or by means of special apparatus ; as this takes place with the admission of ordinary atmospheric air the bacteria and sprout sporules never absent from the air, can act very injuriously upon or infect the beer wort.

That such an infection frequently takes place is proved by the many changes in the beer wort during the cooling processes heretofore practised, and by the various abnormal phenomena of fermentation which occur despite the employment of sound yeast.

In order to obviate these inconveniences we provide the known cooling apparatus with a casing which can be hermetically closed, and bring the beer wort, which runs boiling hot and therefore free from germs or sprout to the cooling apparatus, into contact only with sterilized air which therefore is free from sprout and sporules. By the introduction of sterilized air into the casing of the cooling apparatus at a certain over-pressure during the cooling, the beer wort remains quite free from germs or sprout, and the air necessary for the fermentation is also introduced according to requirements, and the exhalation is effected. The coolers and the sacks for removing the turbidness can be entirely dispensed with, as will hereinafter be more fully explained.

The accompanying drawing represents an apparatus constructed according to the present invention. The said apparatus consists of a wort sterilizing and filtering apparatus A, in combination with a cooling apparatus C and its casing B, and an air-cooling apparatus E, air drying apparatus F, and air filtering device G with a blower D, and the accessory parts necessary therefor.

The sterilizing and filtering apparatus A which can also be used for boiling the wort with the hops consists of an iron or copper vessel *a* which can be hermetically closed and can withstand a pressure of several atmospheres. The bottom *b* is taper and the head *c* is hemispherical. In the interior, above the taper bottom are two superposed filters *d*, *d*¹ the intermediate space *e* between them being filled with sterilized filtering material and hops. In the filtering apparatus A is arranged a steam and refrigerating coil *g* and in the hemispherical head *c* a

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sprinkling rose *f*. On the outside of the apparatus is an exhalation pipe or delivery pipe *h* with a valve *h*¹, in order to close the interior of the apparatus wholly or partly against the outer air, furthermore the clarifying pipes *k*, the mouths of which project inwardly above the bottom *b* of the apparatus and which are each provided with a roof or covering *i*, in order that any solid parts cannot pass into the pipes *k*. These clarifying pipes, only two of which have been shown in the drawing although more may be employed, meet below in a collecting pipe *k*¹ which is in connection with the goose-neck shaped siphon pipe *l*¹ and a bent pipe *l*. Moreover, there is a pump *m* outside the apparatus, by means of which the turbid liquid can be forced through the pipes *n* *n*¹ below the filters *d*, *d*¹ upwards above the same into the filtering apparatus A. On the side of the collecting pipe *k*¹ is arranged, at a suitable point, a cock *k*² through which the whole clarifying apparatus *k*, *k*¹ can be conveniently emptied, and cleaned by means of water under pressure.

The remainder of the fittings consists of the necessary cocks and pipes and other apparatus, comprising a thermometer *o* a beer level gauge *p*, a manhole *q*, an admission pipe *r* with a cock for the entering beer wort, and so forth.

The casing B of the cooling apparatus C consists of an iron or copper casing *s*, capable of being hermetically closed and withstanding a pressure of several atmospheres, which surrounds the surface sprinkling apparatus C at a suitable distance. The latter apparatus can be of any desired form and size, and we do not limit ourselves to the employment of definite forms and sizes of such cooling apparatus but reserve the right of using any of the well known apparatus. The said casing *s* is provided on the outside with an outlet pipe *t* having the adjustable valve *t*¹. The other fittings of the casing consist of the necessary outlet and inlet pipes, cocks, thermometers, man-holes and the like.

According to the kind of the cooling apparatus to be used, these parts, to the features of which no special importance is attached can be varied. Care must be taken that all the parts which lead into or from the apparatus shall be connected hermetically with the casing.

The cooling, drying and filtering device for sterilized air consists of a blower D which draws the air first through a preliminary cotton filter I, then through an air cooler E and an air drier F suitably filled with glowd charcoal. The air is moreover forced through the sprout-tight main filter H or any other suitable air filter and then passes to the filtering apparatus, A when the cock *u* has been placed in the proper position. By turning this cock the air can also be driven into the distributing device K. The latter is arranged in the casing B of the cooling apparatus C; it consists of several pipes having suitably shaped nozzles or orifices *v*, *v*, for the purpose of uniformly distributing the air entering the casing around the cooling apparatus. It may here be specially stated that the parts D, E, F, G, H, I, which serve to filter the air and free it from sprout, can be of any desired construction; as we do not limit ourselves to definite forms and sizes of these apparatus.

The process of boiling sterilizing and cooling the beer wort is mainly effected in the following manner.

The beer wort ready boiled is conducted from the boiling copper together with the hops, by means of the previously sterilized pipe *r* into the sterilized apparatus A filled with sterilized air, at the same time air that is quite free from germs or sprout is forced into the apparatus by the blower D so that a pressure is produced which is regulated by means of the valve *h*¹ in the outlet pipe *h* in such a manner that no ordinary air can pass into the filtering apparatus A. The beer wort can again be boiled by the steam coil *g*; the steam thereby generated is led off through a pipe *h* according to requirements. The beer wort is now left to rest, and all the openings of the apparatus are hermetically closed. The hops take their place upon the upper clarifying partition *d*¹ and after about an hour's rest the beer wort is filtered through the hops and through the sterilized filtering material contained between the two clarifying partitions *d*, *d*¹. By the clarifying device *k*, *k*¹ the beer wort is drawn from the apparatus by means of the siphon *l*¹ and passed through the swan-neck pipe *l* connected therewith into the hermetically closed casing B on to

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the sprinkling apparatus C which has also previously been sterilized; as soon as the beer level gauge *p* indicates no wort, the hop is sprinkled over with hot water free from germs or sprout by means of the sprinkling rose *f*, thereby removing all the beer wort from the hop. During the cooling of the beer wort, purified cool air entirely freed from bacteria and germs or sprout is conducted to and uniformly distributed in the casing B through the air introducing and distributing device K, so that a pressure is produced, whereby the oxygen necessary for the fermentation is conducted to the beer wort, and exhalation is caused according to requirements by the use of the outlet pipe. The water of condensation flows, on the one hand, into the pipe *t* whence it can be let off through a cock, and on the other hand to the bottom of the casing. The beer wort thus treated flows, free from turbidness, and also free from bacteria and sprout, into the fermenting vats. 5 10

The sterilizing apparatus A can also be used directly as a steam brewing copper. For this purpose, at the lowest point of the taper bottom is arranged a three-way cock *x* with a branch pipe to the pump *m*, the forcing pipe of which terminates above in the apparatus *a*. Now before the filtering proper of the beer wort above the hops takes place, the turbid beer wort below the filters *d*, *d*¹, is pumped out, and in again above, until it flows quite free from any turbidness, which can be observed by a test cock *y* on a pipe *n* or *n*¹. The cleaning of the apparatus from the turbid parts remaining behind, and also the rinsing and running off of the wash or rinsing water for the apparatus, pump and other parts can take place by means of the three-way cock *x*. The filtering apparatus A can therefore serve, for sterilizing and filtering the beer wort, and at the same time serve as a brewing copper which can be hermetically closed, in order to enable the wort with hops to be completely boiled in the same. 15 20 25

The steam coil is so constructed that it can also be used for cooling; during the cooling process sterilized air is blown in.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed we declare that what we claim is:— 30

The herein described arrangement of apparatus for the treatment of beer wort in which the admission of ordinary atmospheric air is prevented and into which sterilized air under pressure is introduced according to requirements the said arrangement comprising a vessel A for boiling, cooling, filtering, and airing the beer-wort, which can be closed air and steam tight and which is provided with filters *d*, *d*¹, a clarifying device *k*, *k*¹, steam and cooling coil *g*, and a pump *m*; for the purpose of drawing off the turbid wort below and pumping it in above the filters; in combination with the casing or vessel B (for any sprinkling apparatus) which can be hermetically closed and into which, prior to and during the cooling, sterilized air can be blown and conducted away according to requirements, substantially as specified. 35 40

Dated this 8th day of November 1888.

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